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ABSTRACT

In the summer of 1986 the Institute for Independent Education brought to Washington, D.C., 27 teachers who teach mathematics to children enrolled primarily in grades five to eight at independent neighborhood schools that serve mainly African-American children in inner-city neighborhoods. The program included a training course in mathematics instruction along with a component of follow-up activities. The course came to be known as "MATH Alive!" This evaluation report discusses the structure of the program, its objectives, the evaluation design, and the results that were achieved, as well as some other variables which helped to shape the program. It also includes recommendations for the future design of similar courses of instruction. (TW)

Pilot Teacher-Development Program in Mathematics

(1986-1987)

Evaluation Report

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Evaluation Report

In the summer of 1986, the Institute for Independent Education brought to Washington, D.C., twenty-seven teachers for a training course in mathematics instruction with a component for follow-up activities. This course came to be known as "MATH Alive!"

The following evaluation report discusses the structure of the program, its objectives, the evaluation design, the results that were achieved, some other variables that helped to shape the program. It also includes recommendations for the future design of similar courses of instruction.

I: Program Description

Twenty-seven teachers spent two weeks in a summer residential program sponsored by the Institute for Independent Education and held on the campus of The American University in Washington, D.C. The teachers who were selected to participate in the "MATH Alive!" course taught mathematics to children enrolled primarily in Grades 5 to 8, at independent neighborhood schools. These are schools that serve primarily African-American children in inner-city neighborhoods.

Of the teachers who participated in the seminar, 22 had bachelor's degrees, and seven had additional masters' degrees. Four had majored in mathematics, and some had taken math-related courses like computers. Fifteen had degrees in elementary, secondary, or special education , and some had degrees in curriculum development.

Prior to the summer, participants were sent reading material, such as reprints of newspaper articles and brief reports, covering the various issues in contemporary mathematics education that were to be discussed during the seminar. On arrival, they received a registration kit, consisting of a detailed outline of all lectures, several books, more articles as reading material, and sample manipulatives.

The agenda for the summer course, seen in Appendix A, included lectures and workshops, in the following areas:

Mathematics: 15.75 hours
[Number systems, number theory, geometry, and probability and statistics]

Problem-Solving Applications: 9.5 hours
[Each of the above course segments also had approximately two hours of problem-solving applications.]

Classroom Management: 18.25 hours
[Issues, understanding children, the learning environment, curriculum content/ format/issues, enabling activities, math anxiety, and demonstrations]

Learning Teams: 9.5 hours
[Developing field projects in small groups, peer interaction on lectures, and exchanging successful experiences]

Guest Speakers: 4 hours
[Cultural foundations, motivating children, and African contributions to mathematics]

Other: 4 hours
[Microcomputers in learning & classroom management, 3.75 hours; Textbooks and materials from publishers, 2 hours; and a written paper on classroom applications for history of Africa in mathematics.]

Some of these sessions were videotaped so that teachers from schools that could not participate would be able to learn about the experience.

After the seminar, the faculty and some of the participating teachers were interviewed by telephone to obtain and assess their frank reactions to the summer experience.

In the fall and winter months following the seminar, the course faculty visited several schools, conducting regional workshops and consultations with the "MATH Alive!" participants.

A report was published in two main volumes. Volume 1 covered issues of classroom management. Volume 2 dealt with the content area of mathematics, both for training teachers and in elementary grade classrooms. A supplementary pamphlet on "math anxiety" was also developed.

The principal faculty for the "MATH Alive!" summer and follow-up experiences were: Dr. Gerald Chachere, Assistant Professor of Mathematics, and Dr. Tepper Gill, Professor of Mathematics, Howard Univer-

sity, who taught concurrent sessions in mathematics; and Dr. Bess Howard, an independent consultant and trainer, who conducted sessions on classroom management.

There also were guest speakers, including Dr. John Henrik Clarke, Historian; Dr. J. Arthur Jones, Mathematician and Tutor; Dr. Edwin J. Nichols, Psychologist; Sister Mu'minah M. Saleem, Resource and Demonstration Teacher; and Karen Vogel, Computer Specialist.

II: Objectives

The "MATH Alive!" course was designed for the professional renewal of mathematics teachers in elementary grades, and it had four major objectives, as follows:

1. To reinforce and expand the participants' information on basic mathematical principles;

2. To enable teachers to use analytical strategies in explaining and demonstrating the content of their courses;

3. To develop curriculum components at the schools;

4. To develop a sense of teacher professionalism and awareness of resources

III: Evaluation Design

The evaluation design for the "MATH Alive!" experience was prepared by an independent evaluation consultant, Ms. Stella Gomes, who also supervised the collection of the evaluation data for this report.

The evaluation program was designed to measure the effects of the training against the objectives and thus determine whether the intervention strategies employed were effective and, if so, to what degree. It was intended specifically to assess the degree of change in content area knowledge, professional practices, and the beliefs and attitudes of participants toward the profession.

The design was adapted from Hammond's Multivariate Model to a PPF model, which incorporates Pre-assessment, Post-assessment, and Follow-up, as seen in Figure 1.

This model measures the effect of the program using different instruments, permits variable temporal elements, and is adaptable to measure

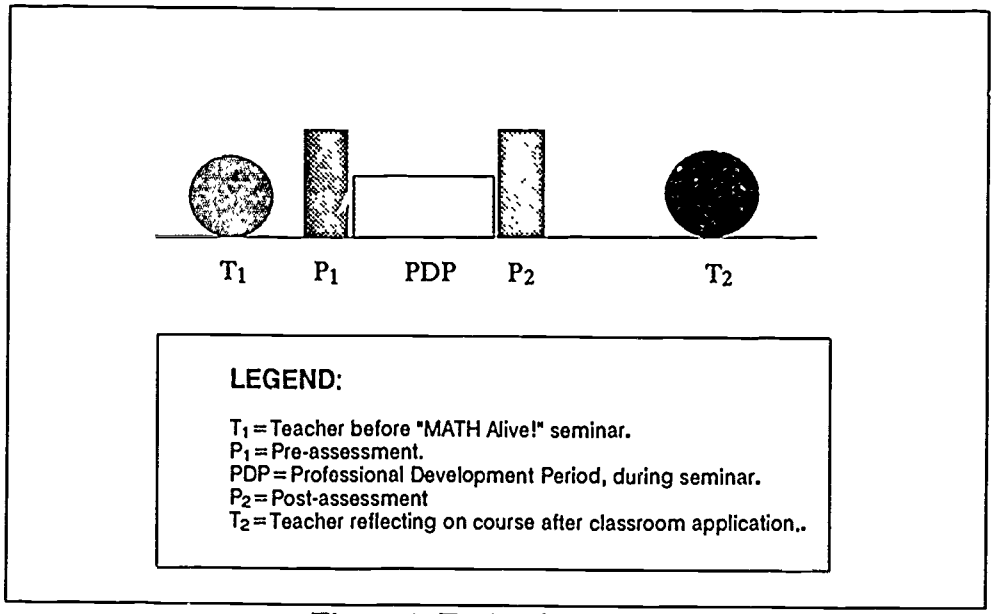


Figure 1: Evaluation Model

such factors as changes in attitudes, the degree of application of content learned, and the degree of change in content area knowledge. The Post-assessment was intended to measure change that has occurred during the professional development period. The Follow-up assessment measured attitude change after a period of implementation in the field.

The specific objectives of this evaluation were to measure the following:

1. The effects on the participants of "MATH Alive!" as a professional development program; 2. The level of satisfaction participants had with the outcomes; and 3. The degree of application for what was learned in "MATH Alive!"

These objectives were chosen so that the following questions could be answered: Did participants increase their knowledge in mathematics? Did they apply what they learned? Did they feel renewed when they returned to their schools? How well were the goals of "MATH Alive!" met? How should future professional development programs be designed?

The instruments that were developed to measure progress toward these objectives included: 1. Pre-test on attitudes (Appendix B); 2. Post-test on attitudes (Appendix C); 3. Basic Skills and Applications Test (Appendix D); 4. Math content pre-test for Group I (Appendix E); 5. Math content post-test for Group I (Appendix F); and 6) Math Content Post-Test for Group II (Appendix G).

Consultations between the evaluator, the faculty, and the project director ensured that the evaluation program did not examine extem-

poraneous variables and that content-related issues were consistent with the program.

IV: Analysis of Results

Quantitative, interview, and observational data were gathered during the "MATH Alive!" experience, and they were analyzed to determine whether the objectives were achieved and to identify the effects of other variables.

A. Achievement of Objectives

There were four main objectives for the program, dealing with the acquisition of information on mathematical principles, the development of curriculum components, improving the analytical strategies of participants, and enhancing teacher professonalism.

1. Information on Mathematical Principles

The teachers acquired information on basic mathematical principles during the lectures by Drs. Gill and Chachere, covering number systems, number theory, geometry, and probability and statistics. Their levels of achievement were measured by instruments that were designed by the faculty and the evaluator.

The participants were given a pre-test, consisting of 50 problems to test basic skills and 12 problems to test problem-solving applications. The results led the faculty to divide the participants into two groups, one with apparently higher skills than the other. As seen in Table 1, 14 out of 27 (52 percent) of the teachers were placed in Group I. Teachers who scored below 70 percent were placed in Group II.

The average performance for Group I was 88 percent on the basic skills. They also fell within a relatively small range, between 96 and 76 percent. This group scored an average of 90 percent on the applications (Range: 100 to 67). Group II, on the other hand, had an average performance of 49 on the basic skills, with a wide dispersion of between 64 and 24 percent. The average score for this group was 41 percent on the applications (Range: 83 to 8).

Both groups proceeded through instruction without knowing how well or how poorly they did on the pre-tests, and no explanation was given on the rationale for dividing the participants into two groups. The faculty also decided to see if both groups could follow the same course outline

Table 1
Groups I and II: Basic Skills and Applications
Pre-Test
(In Percent Correct)

Group I			Group II		
Teacher	Basic	Appl.	Teacher	Basic	Appl.
23	96	100	26	64	24
25	96	100	11	62	33
7	92	100	22	60	83
14	92	92	12	58	42
21	92	83	8	56	42
24	92	92	6	54	50
9	90	100	5	50	50
15	88	92	10	48	42
18	86	92	20	44	42
1	84	67	17	42	42
4	84	92	16	40	33
3	80	100	13	32	8
19	80	83	27	24	42
2	76	67			
Mean	88%	90%		49%	41%
Rank Difference Correlation:	r = .56			r = .17	

and to remain flexible to adjust for differences in skill levels. Group I, which was more homogeneous in skill levels, covered it faster and with less repetition than did Group II, which had greater variability in skill levels.

The correlation between scores suggests that performance on the basic skills test is not a good indicator of performance on the applications test, especially for Group II.

Because Group I, which we will refer to as the more advanced group, did so well on the basic skills test, they were given an additional pre-test to show what they knew about the course material they were going to receive. The results are shown in Table 2. Unfortunately, the items in the pre-test did not match all the items in the post-test. Therefore, gains cannot be shown.

It should also be noted that most of the teachers had not been students in a rigorous classroom setting for quite some time. Twelve of the 14 teachers in Group I, had not returned to a university since their graduation for any type of instruction during the past six years. Eleven of the 13 in Group II, had been out of college for 11 years. Only half of

each group had taken additional courses of any type, and this had been in the past one to two years.

It was also found that, at least for Group I, their performance on the basic skills pre-test was a good indicator of how they would absorb the course content and subsequently perform on the content post-test. (See Table 3.) However, Group II scored less well on both the basic skills pre-test and the content post-test, with an extremely low correlation between the two.

These data seem to indicate that for those who did score well on the pre-test, they were more likely to benefit from the material covered in the course and from the type of instruction they received. For those who did not do well on the pre-test, the low correlation would indicate that one or more of the following may be true: a) a different emphasis in the course content might have served their needs better; b) the instruction strategies may not have been appropriate; or c) the instructors should have reviewed basic skills more thoroughly before proceeding with the content, perhaps in a session longer than two weeks.

Extending the term of the seminar has been an option recommended by many people, including the teachers themselves. However, providing an alternate program of study for those who score low on the basic skills test would require the development of two separate curricula. This means that the solicitation net must be cast to a wider group of applicants in order to make smaller study groups cost-effective operations.

Table 2
Group I : Course Content, Pre-Test and Post-Test
(In Percent Correct)

Teacher	Pre-Test	Post-Test
23	37	46
25	47	75
7	22	72
14	26	67
21	35	67
24	30	74
9	30	69
15	37	44
18	9	34
1	24	48
4	32	34
3	19	33
19	22	49
2	16	20
Mean	28%	52%

Table 3
Groups I & II: Basic Skills Pre-Test and Content Post-Test
(In Percent Correct)

Group I			Group II		
Teacher	Basic	Content	Teacher	Basic	Content
23	96	46	26	64	20
25	96	75	11	62	30
7	92	72	22	60	60
14	92	67	12	58	90
21	92	67	8	56	50
24	92	74	6	54	50
9	90	69	5	50	10
15	88	44	10	48	40
18	86	34	20	44	70
1	84	48	17	42	30
4	84	34	16	40	40
3	80	33	13	32	20
19	80	49	27	24	20
2	76	20			
Mean	88%	52%		49%	41%
Rank Difference Correlation:		r = .75		r = .27	

2. Analytical Strategies

One purpose of "MATH Alive!" was to encourage teachers to use analytical strategies in explaining the content of their own courses. An applications pre-test was designed to measure the skills in problem-solving they had on entering the course. The participants were clearly divided into two groups, as previously seen in Table 1.

The scores on applications were compared to the scores on content acquisition to see if the ability of participants to apply basic skills related in any way to their mastery of the content, and the results may be seen in Table 4.

Group I, which was known to have had high basic skills (having a mean of 88%), and to have applied those skills well (90%), performed less well on the content pre-test (52%). There was also a rank difference correlation of .35 between the applications pre-test and the content post-test.

Even though there was a significant component for problem-solving (9.5 hours for problem-solving, compared to 15.75 for mathematics content), the instruction for Group I did not appear to draw on the problem-solving skills that the teachers in this group demonstrated they had.

This may have been because the lectures were presented in a manner that was too abstract.

Group II, on the other hand, had lower scores on the basic skills (49%), the applications pre-test (41%), and the content post-test (41%). There was a correlation of .52 between the applications and the content tests. The project staff observed that the instruction for Group II was given at a much slower pace than for Group I, concepts were explained in greater detail, and more practical examples were given. This may explain why there is a stronger relationship between performance on the applications pre-test and the content post-test.

Self-analysis by the teachers was also an important part of the course. The post-seminar interviews of the faculty revealed a consensus that the most dramatic effect of the course on the teachers was their general awakening to and analysis of themselves, the learning styles of the children they taught, and the environments in which learning took place. For the first time, teachers became aware of how their own personal anxieties and the attitude of society toward mathematics tend to handicap children in understanding and enjoying mathematics, or in pursuing math-related careers.

Table 4
Groups I & II: Applications Pre-Test and Content Post-Test
(In Percent Correct)

Group I			Group II		
Teacher	Appl.	Content	Teacher	Appl.	Content
23	100	46	12	42	90
25	100	75	20	42	70
7	100	72	13	8	20
14	92	67	8	42	50
21	83	67	16	33	40
24	92	74	6	50	50
9	100	69	10	42	40
15	92	44	11	33	30
18	92	34	26	24	20
1	67	48	27	24	20
4	92	34	17	42	30
3	100	33	22	83	60
19	83	49	5	50	10
2	67	20			
Mean	90%	52%		41%	41%

Rank Difference Correlation: r = .35 r = .52

The participants did not seem aware, however, that a high level of pre-seminar analytical reading was required of them. While a few teachers were selected at the last minute as replacements, most of them received packages of Advance Reading Material that were sent out with the notification that their applications had been accepted. These packages included articles and reports which analyzed and discussed issues relevant to the course. An additional package of Supplemental Reading Material was distributed with the registration kits on the evening before the first day of the course.

One week after the summer seminar had started, a questionnaire was administered to see what attention had been given to each piece of the advanced and supplemental reading material. On the whole, the teachers had only skimmed the material, while only a few actually had read it in depth. (See Table 5.)

Applicants should be made more aware in the advance publicity material that questions from the reading material will be included in a placement test on the first day, or they could be sent in advance, for each piece of reading material, a two-page form with a fixed format for analytical responses to be handed in on the first day of classes. However, as the Institute becomes more well known for its "MATH Alive!" seminars, applicants will become more aware of what is expected of them, but this process will take time.

3. Curriculum Components

One of the specific objectives of the "MATH Alive!" course was to influence how teachers developed their curricula when they returned to their various institutions. To the extent that information was available, the results were mixed.

First, the participants were asked to bring to the summer seminar a copy of their school's mathematics curriculum so that discussions about issues that arise in curriculum planning could be reinforced by actual examples from curricula in use. Most of the teachers did not bring their curriculum, although some did bring parts of their curriculum or new material that they intended to incorporate in the coming year. This aspect of the program, therefore, was redesigned.

During the seminar, Dr. Howard presented state-of-the-art information on Classroom Management. Although this segment became more theoretical than practical because of the absence of actual curriculum examples, it nevertheless contained lectures and workshops covering the issues, content, and format for curriculum design.

There were also informal peer groups known as "learning teams," where the teachers were able to share their classroom experiences with

each other and assist each other in mastering the seminar course material.

Supplementing the main workshops were guest lectures by Dr. Edwin Nichols, who spoke about the cultural foundations for teaching African-American children. Dr. John Henrik Clarke outlined the contributions Africans have made to the development of mathematics, science, and technology, from the days of Ancient Africa to the contributions of African-Americans in contemporary society. In addition, Sister Saleem bridged the gap between theory and practice, using the subject of

Table 5
Advance and Supplemental Reading Material

Title/Author/Publisher of Article/Booklet	Rating
The Way We Teach Our Children Math Is a Disgrace John Saxon, *American Education*	3
An Agenda for Action (1986) National Council of Teachers of Mathematics	2
Math: Pure and Applied Backed Robert Rothman, *Education Week*	2
SAT Averages by Ethnic Group, 1976-1985 The College Board	2
Mathematics and Science Learning: A New Conception Lauren Resnick, *Science*	2
What Makes a 'Quality' Elementary School *Education Week*	2
R&D Notes: Mathematics, Science, Technology Linda Shalaway, NIE	2
Computers *Education Week*	1
16 Highly Rated Educational-Software Programs *Education Week*	1
Mixed Signals: Computer Plans Frustrated by Incompatibility William Snider, *Education Week*	1
Making Math 'Add Up' for Kids *Gifted Children Monthly*	1
Teacher Testing Then and Now *Education Update*	1
Classroom Calculators Add to Math Illiteracy John Saxon, *Wall Street Journal*	1
Mathematics and Astronomy *Arab Civilization*	1

LEGEND: 4 = Read it thoroughly, analyzed it, and now can discuss it without reviewing it; 3 = read it more than once but do not remember much of it now; 2 = read completely, once, then put it aside; 1 = skimmed over; 0 = did not read at all.

numeration to demonstrate practical teaching strategies and the use of teacher-constructed manipulatives. There was also a session on the uses of computers in mathematics instruction, presented by Karen Vogel, an employee of IBM Corporation.

An effort was made to see how the teachers would apply in their own classrooms the principles they had learned about classroom management, as well as the extent to which they could synthesize the other information presented during the course. They were asked to select one of the following scenarios and write their responses to it:

"1. Select one of the postcards provided and explain how you would plan a math lesson or series of lessons relating the content of the pictures to the math concepts you are presenting. Specify grade level, equipment, steps you would follow, objectives, activities, and methods of assessing how well your students learn.

"2. You are taking your math class on a field trip to New York City. Describe the math-related preparatory activities you would engage your students before the trip. Describe the math lessons they would experience while on the trip.

"3. Your principal has asked you to organize a career day for exposing your students to the kinds of careers related to mathematics. Explain how you would prepare your students to be ready for this career day experience.

"4. The Army Corps of Engineers has decided to do something about the drought in your State, and you have been asked to help them by involving your math students in learning activities related to the shortage of water. A huge cistern is going to be built to hold water which will be used to irrigate the fields. What lessons will you plan for your students?"

The majority of the participants chose problem number two, followed by problem three. Only three participants chose to answer problem one, while two chose problem four. All responses looked at creative ways to bring mathematics into these activities.

Future "MATH Alive!" programs should devote more attention to developing this type of exercise as an integral part of the actual instruction. It could also be developed as a more effective instrument for measuring the acquisition of knowledge or skills by yielding objective data on performance, as well as causing the responses to be spread more evenly over the number of available questions.

Based on the information provided to the teachers during the seminar, the faculty and project staff urged the teachers to develop "field projects" through which they would implement the theory when they returned to their classrooms. These projects were to include the following elements:

- Provide a description of the current types of mathematics instruction and the procedures utilized for evaluating the students;
- State how the teacher would like the instruction to be improved;
- Identify the specific objectives needed to close the gap between the two previous items;
- Identify the support needed within the school to reach the objectives;
- List the specific strategies that will be used to make the desired change;
- Explain the steps to be taken in getting the project started;
- State how the "MATH Alive!" faculty can assist in these efforts.

Rather than submit written field projects before the course ended, the teachers preferred to return to their schools and develop the projects in the context of their normal planning for the next year. It appears to have been unrealistic for the Institute to expect that teachers would make detailed curriculum plans before school convened.

One follow-up report was very promising, indicating that the teacher had synthesized the entire summer course content, analyzed the extent to which it was relevant to her, and then incorporated it into her curriculum. She created a fictional character based on the experiences of the children in her classroom. She presented the sequence of skills that this character acquired; she integrated the disciplines of geography, history, and reading with the study of mathematics; and she included an evaluation component for her project.

The Institute believes that reports like this should be developed further in coming programs. Furthermore, some of the participants in the 1986 seminar could become *teacher consultants* to future "MATH Alive!" programs, where they could develop their ideas further, objectively test implementation in their curricula, and widely disseminate the results to teachers in other types of schools.

From a project-management standpoint, it was decided that collecting objective data on changes in curricula at each of the schools was impractical: it would have been too expensive, very intrusive, and even intimidating for schools just beginning to work with an organization like the Institute.

The Institute also was not prepared, within the limits of this project, to assess teacher development by examining student outcomes. However, informal communications with other teachers and administrators, especially during the follow-up visits, indicated that there were positive developments among their students.

Another way in which this project was originally designed to have an impact on the curricula of schools was by presenting them with a videotape of portions of the seminar. This was not very successful. The sum of $1,000 allocated for purchasing equipment proved to be unrealis-

tic. Even after a formal budget realignment to permit contracting out the service, the minimal increase still was totally inadequate.

It was subsequently determined that the cost of producing quality videotapes of major portions of the summer seminar would have equalled or surpassed the entire cost of this project. Some footage, however, was preserved for editing with tapes from future seminars, and a short tape featuring "MATH Alive!" and describing the Institute was created as an interim effort.

4. Teacher Professionalism

The course demonstrated to teachers the accepted standards for teacher professionalism and the latest textbooks and materials for instruction. This was made possible through lectures by Dr. Howard, in the samples of textbooks made available by publishers, and in the learning teams.

The faculty were careful not to let this particular course, with its limited focus and funding, increase the frustration felt by teachers whose struggling institutions could not always afford new textbooks or the latest expensive materials. Instead, both Dr. Howard and Sister Saleem described how teachers can obtain professional results by creating their own manipulatives from materials which are readily available at school.

Another important part of the course was to measure changes in professional attitudes among the teachers. Both groups were given attitude surveys, one as a pre-test and one as a post-test. These instruments explored the teacher's perceptions about themselves, their skills, and their professionalism. It also asked them what they expected from the course, compared to what they felt they had received. We specifically examined the responses to questions that dealt with math anxiety, that is, the teachers' confidence in their own understanding of mathematics and in their ability to continue teaching it. Their perceptions are reflected in the data from the attitude pre-tests and post-tests that are displayed in Table 6.

This table shows that after the summer seminar, almost all the participants demonstrated an improvement in their attitude between the pre-test and the post-test, from the *most* positive change of 12 points to the *least* positive improvement of 1 point. There was one person whose attitude did not change, and two people appear to have left the course with a negative attitude.

Looking at the performance of teachers in Group I, as opposed to Group II, additional findings can be noted. At the end of the course, Group I had an average attitude improvement of 4.6 points (Range: a gain of +10 points to a loss of -5 points). Group II, however, had an average attitude improvement of 5.85 points (+12 to -1), even though

they came to the course less well prepared than Group I and also had greater difficulty keeping up with the course outline.

One person in each group experienced a negative attitude change. In open-ended responses on the post-test, the teacher in Group I who had a negative attitude found that the course made demands on her for participation that were different from what she had expected, while the teacher in Group II simply said she did not have enough time to cover the material.

Table 6
Groups I and II: Attitude Pre-Test and Post-Test
(In Gross Scores)

Group	Teacher Number	Attitude Scales			Content Change
		Pre-Test	Post-Test	Change	
II	12	47	35	12	12
II	16	53	42	11	- 4
II	11	48	37	11	0
I	25	45	35	10	28
II	27	44	35	9	18
II	8	39	31	8	30
I	21	49	41	8	32
I	24	46	38	8	44
II	17	41	34	7	20
I	4	36	29	7	2
I	23	45	39	6	9
I	19	44	38	6	27
II	5	40	34	6	- 4
I	2	33	28	5	4
I	9	40	35	5	39
I	15	37	32	5	7
I	18	40	35	5	25
II	20	40	36	4	0
II	10	41	38	3	14
II	22	44	41	3	20
II	6	41	38	3	-18
I	1	45	43	2	24
I	3	36	35	1	14
I	7	39	38	1	50
II	26	35	35	0	- 2
II	13	38	39	- 1	18
I	14	37	42	- 5	41

NOTE: The most positive gross score (best attitude and highest self-confidence) would have been 17, and the most negative score would have been 85.

In additionh the following should be noted:

- First, the most positive attitude changes occurred equally in both the more advanced and the less advanced groups, and the least positive changes were also evenly distributed between the groups.
- Second, there seems to be no relationship between attitude change and change in the amount of content acquired by taking the course.
- Third, if the gross scores are converted to an average individual response on a five-point scale for 17 items, the anxiety levels of the average respondent decreased two points, from a negative score of "4" to a more positive score of "2."

B. Other Aspects

Some of the other aspects of the program included the process for recruiting and selecting teachers, follow-up visits, and dissemination.

1. Recruiting and Selecting Applicants

A leaflet advertising the summer seminar was sent to over 200 schools nationwide. They also were informed that the selection for 1986 was limited primarily to schools in the Northeast and Southeast on a first-come/first-served basis.

Applicants were required to submit, in addition to the demographic information, responses to the following open-ended questions:

- How do you define your relationship with the children in your classroom?
- What are your strengths as a teacher of mathematics?
- What are your special needs as a teacher of mathematics?
- How do you think this course will help you in your classroom?

Applications were received from 45 teachers, and the final group of 27 teachers met the following criteria: Their expectations had a close fit with the seminar objectives; they responded to the open-ended questions in an articulate manner that usually included perceptive or analytical comments; and they demonstrated prior interest in self-improvement by having taken additional courses after graduation.

For the group as a whole, there was a mixture of teachers who had considerable, intermediate, and little or no experience; there was a broad geographical representation of at least the Northeast and Southeast; and teachers primarily taught in middle school, although there were some whose primary experience was in the higher and lower

grades. Application fo ms were also countersigned by school administrators, who agreed to *consider* (not necessarily *implement*) ideas brought back by their teachers. Finally, a few applicants were unable to attend because of last-minute changes in their personal circumstances, and replacements were selected from remaining applicants.

The process for selecting applicants can be improved for future seminars if applications are not limited to a narrow geograhical region. It was very difficult to turn down some obviously good candidates in 1986. In addition, as the Institute becomes more well known among independent neighborhood schools and the public, it will be able to attract applicants on a more competitive basis than was possible in the pilot year of this project.

2. Follow-Up Visits

Regional workshops were held as follow-up visits for the teachers who participated in the 1986 summer "MATH Alive!" experience. Even though these workshops were designed for the seminar participants, other teachers at their schools and their school administrators joined in the follow-up workshops. Parents attended at least one session.

The workshops were designed in the following manner. After the teachers had returned home, they were encouraged again to submit written field reports. The reports that were submitted were analyzed, and several themes became apparent to the project staff. Teachers in the same geographic area who were concerned about similar issues were then invited to attend follow-up workshops held at selected schools. A description of these seminars appears in Table 7.

Invitations also were sent to other known independent schools in those cities, as well as to seminar participants in nearby cities within reasonable commuting distance. All the teachers who had requested assistance were included in the follow-up plans.

There were three different types of workshops as follow-up to the summer seminar. One of the most popular subjects requested by the teachers was Dr. Howard's workshop on math anxiety, as well as a workshop on how to develop a mathematics laboratory that will motivate students. Teachers in the District of Columbia had said they were interested in learning how to cope with math anxiety among their students. They also wanted to learn how to develop a mathematics laboratory so that they could encourage their students to enter more extramural competitions in science and mathematics, and they wanted to find ways in which they could stress mathemathics during the school's Career Week.

The New Jersey teachers also wanted to get information on math anxiety. However, they included parents in their workshop because they

wanted to explore how parents transferred some of their own anxiety about studying mathematics to their children. In addition, they wanted parents to learn about some of the teacher-made manipulatives that could be used at home to reinforce some of the mathematical concepts discussed in the classroom.

Teachers in New York wanted to emphasize the integration of mathematics with other curricula, along with information on math anxiety and how to develop mathematics learning centers for different grade levels. At these workshops, the teachers examined the physical environment of the laboratory, the manipulatives to be used, and how teacher/student relationships can have an impact on student learning.

The second type of workshops was a demonstration class held at a school in Philadelphia, where Dr. Gill taught one group of children in the primary grades and another in the middle grades, while teachers and

Table 7
Follow-up Visits to Schools

12-4-87 St. Barnabas Episcopal School, Philadelphia, PA
Dr. Tepper Gill
A demonstration class, conducted with elementary and middle school students

12-19-87 St Thomas Community School, New York, NY
Dr. Bess Howard
"Math Anxiety: What are its sources, its impact on learning, and how to deal with it" and "Developing a mathematics laboratory: What it is, what are the costs and payoffs, and how to manage it."

2-7-87 Afrikan People's Action School, Trenton, NJ
Dr. Bess Howard
"Math Anxiety I: Blocks to student achievement and how they are transmitted" and "Math Anxiety II: How parents and teachers can deal with it"]

3-18-87 Holy Temple Christian Academy, Washington, DC
Dr. Bess Howard
"Math Anxiety: What is its impact on learning and how to deal with it" and "The Mathematics Laboratory: Options for development and management"

5-23-87 Piney Woods Country Life School, Piney Woods, MS
Dr. Sister Mu'minah Saleem
"Numeration: Whole numbers and decimals; Fractions and mixed numerals; Suggested test items and word problems for Levels 1 to 9; Ordered pairs game board and activities for testing for Levels 1 to 9"

(A trip to Baton Rouge, Louisiana, was scheduled and cancelled twice.)

administrators served as critical observers. The teachers had expressed an interest in how they could focus on the actual learning needs of their students, rather than be blindly committed to following a pre-set curriculum plan and rigid time schedule. Dr. Gill showed how the associative, commutative, and distributive properties could be taught sucessfully and in a highly-motivating manner to both groups of children, using blackboard illustrations and Cuisenaire™ rods.

The third type of workshop, led by Sister Saleem, focused on teaching children to use the "language" of mathematics correctly when working with whole numbers, fractions, and decimals. As with the other seminars, the focus was on helping elementary school children reduce their levels of math anxiety, but she specifically emphasized how to make children more comfortable and better prepared for the testing environments they must encounter in later grades.

She produced for the Institute several large portable displays, incorporating manipulatives and quizzes for children studying numeration, and these were presented to teachers as materials they could build for their own classrooms. These modules were so well received by the teachers, that the Institute intends to explore the development and use of these types of manipulatives in future "MATH Alive!" programs.

Since Sister Saleem was a guest faculty member, and her material was not included in the original evaluation instruments, participants in her follow-up workshop were asked to evaluate the content, materials, and presentation at the session, in addition to making recommendations for workshop improvement in the future.

Using a five-point scale, with five being the most positive, the teachers, on the average, gave the rank of 4.9 to the workshop leader for her effectiveness. The benefits of the workshop as a whole were ranked at 4.8, and the rank of 4.6 was given to the workshop for accomplishing its objectives. The handout materials were assigned a rank of 4.5; the presentations on whole numbers, decimals, fractions, and mixed numerals were ranked at 4.4; and the discussion of test items and test strategies was ranked 4.3. Among the suggestions for improvements, the teachers wanted a similar workshop for parents and students, emphasis on the upper grades (7 to 12), and much more time than one day to absorb the material and pose questions to the workshop leader.

The regional workshops that were held at the schools had the important effect of helping teachers bridge the gap between theory and practice. It stimulated considerable discussion on curriculum issues that many of the teachers had not previously considered. It also allowed them time to reflect on the unique circumstances of specific children in their classrooms, which they were unable to do during the summer seminar because of the amount of material to be absorbed in a limited two-week period.

One of the major constraints to follow-up is that participation in this course was voluntary for teachers and administrators. Since the schools are independent, and the Institute is not a membership organization, the Institute could offer no incentives for upgrading the position or salary of teachers who completed the course, as is the case in government schools. Implementation of the ideas was also voluntary on the part of the principals and school administrators, who traditionally guard their proprietary right to affect their curricula and even to reallocate personnel from teaching mathematics to teaching some other subject.

Once the seminar had ended, however, it was generally difficult to get responses to questionnaires from institutions that are preoccupied with survival. However, the follow-up experience also gave Dr. Ratteray, the project director, an opportunity to assess personally the impact of the course in the field setting, which was expecially important for schools with whom the only prior contact had been by telephone. She also was able to get direct answers to questions in face-to-face meetings with school administrators and teachers.

In the long term, the voluntary nature of the relationship between the schools and the Institute could be described as an asset rather than a liability. The absence of coercion implies that continued involvement in "MATH Alive" activities springs from a genuine desire by teachers for self-improvement.

The second constraint on follow-up is the need of small, struggling institutions to remain administratively flexible. While most of the teachers were not administrators at their schools, able on their own initiative to implement changes, some of them were. Other teachers found that their new expertise put them in a leadership position among their peers, because they were able to conduct workshops and enthusiastically tell others about what they had learned in the summer. Some of the teachers were reassigned by their principals from teaching mathematics to teaching other subjects, but they reported that at least the Curriculum Management components of the course were directly useful in their new work experience.

A few of the teachers left their independent schools and went to work at public schools, where they presumably will apply the knowledge they gained. Some were completely lost to follow-up, although subsequently mailed reports are not being returned to the Institute by the Postal Service.

Nevertheless, a final survey was taken in February 1987. The 27 teachers who participated in the 1986 summer seminar were asked for their retrospective view of the course, since they had had an opportunity to implement some of the concepts in their classrooms. There were 10 responses, six (43 percent) from teachers who had been placed in Group I and four (31 percent) from Group II teachers.

The teachers were asked if they were still teaching at the same independent neighborhood school where they taught in 1986 and if they were still teaching mathematics. Eight out of 10 were at their original school, while seven were still teaching mathematics. They were also asked to rank each component of the course on a five-point scale, with "1" being the least useful to them and "5" the most useful.

The following components received a rank of "4": In Mathematics: Number theory, geometry, and probability and statistics; all the segments of Classroom management (Who is that Child? The learning environment, Curriculum development, Developing enabling activities, Math anxiety, and the Learning teams); Guest speakers Dr. Nichols (Cultural founations), Dr. Jones (Innovation and Motivatin), Dr. Clarke (African contributions), and Sister Saleem (Language of mathematics).

The teachers assigned a rank of "3" to the following: Number systems, probability and statistics, and a written paper by Walter Young on early African mathematics. The computer session was the least useful, with a rank of "2." Efforts are being made to improve the presentation of the material in these three categories.

3. Dissemination

Dr. Howard's sessions on Classroom Management and the guest speakers on related topics were recorded and some of them were transcribed. They were all summarized and appear in Volume I of the final report. The manual, written especially for this course by Dr. Chachere and Dr. Gill, was summarized, and it appears in Volume II, along with the presentations of related guest speakers. It was also decided to produce an additional pamphlet summarizing the discussions by Dr. Howard on math anxiety, since this was a very popular aspect of the follow-up and one in which other schools and parents might be interested.

These reports were distributed free to all independent neighborhood schools, as well as to selected educators and education policymakers on a list compiled by the Institute. Others were sold for the cost of printing, postage, and handling to the general public.

The advertisement in Figure 2 was a two sided postcard, in black ink and one PMS color, that became part of a "deck mailing" by the *Instructor* magazine. In January 1987, it was sent to 75,000 subscribers to that magazine, including teachers, principals, curriculum directors, and librarians for Kindergarten through grade 8. The respondents who purchased one or more volumes came fom over 20 States, and many of them specifically identified themselves as teachers in public schools.

The cost of producing the volumes was definitely underestimated in the project budget. The Institute's experiences with Volumes I and II,

Figure 2: Advertising Postcard

as well as the additional math anxiety monograph, will be useful in preparing future budgets. In this instance, the Institute bore most of the cost of advertising in order to determine the potential for this medium, and the results are very encouraging for an expanded and highly targeted program of advertising in the future.

A summary of the material presented in the summer seminar was reported in *American Choices*, the Institute's newsletter (Appendix H). This publication was mailed to a list of 6,000 names, including sponsors of the Institute, education policymakers in Washington, D.C., and the States, as well as a very large list of African-American professionals in all the major disciplines.

Another successful approach to dissemination was the syndication of an article in the print media. Dr. Ratteray's article, "'Math Alive' Trains Teachers," (Appendix I) appeared in 13 newspapers that serve African-American communities across the country. It was published in Arizona, California, the District of Columbia, Florida (Miami and Daytona), Georgia, Indiana, Michigan, Nebraska, New York, and Wisconsin.

Finally, Dr. Ratteray discussed "MATH Alive!" in her speaking engagements, which included conferences sponsored by the National Council on Educational Research and by the National Association for the Advancement of Science, as well as on various talk shows on commercial radio stations.

V: Implications for Future Course Design

As a result of the "MATH Alive!" experience, the following specific changes are recommended for future courses:

1. Conduct the summer seminar near an independent school so that the seminar participants and the school can benefit from multiple classroom demonstration sessions (in addition to demonstration sessions already included in the follow-up experience);

2. Reduce the amount of advance reading material, or require a written assessment of it before the course in order to qualify for admission;

3. Design the lectures and workshops so that they include the following changes:

- Make demonstration teaching in a class of elementary school students an important part of the program;

- Increase the time given to bridging the gap between theory and practice, as well as using teacher-made manipulatives to demonstrate concepts in mathematics;

- Incorporate problem-solving applications into the lectures rather than schedule them as separate activities; Increase the focus on reducing "math anxiety" among participants when they begin the course;

- Reduce the time spent on learning teams, make them more structured in marshalling the individual experiences of teachers and in presenting techniques for developing curriculum components;

4. Allow participants who do not score well on a basic skills pre-test to have individualized attention on the specific problems they have, based on an immediate item analysis of the test responses; and, if necessary, significantly reduce the amount of the course outline they are expected to cover;

5. Eliminate the need for participants to submit written reports once they leave the seminar and become distracted by their day-to-day activities.

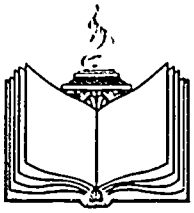
6 If the section on microcomputers cannot be significantly expanded, it should be eliminated altogether;

7. Substantially increase the role of videotaping, both as a medium for feedback during the course and for recording substantive course content for later distribution, and significantly increase funds allocated for editing the tapes that are collected;

8. Include both funds and time for more extensive follow-up visits, so that project staff could personally visit schools, demonstrate techniques and materials, measure the effects of seminar instruction, and maintain personalized communications, since it was found that busy administrators seldom have the time to sit back and leisurely read professional development literature, especially material that competes with the deluge of advertising already received in the mail from commercial publishers.

We feel that implementing these changes would significantly improve the structure and presentation of the course, as well as improve its adaptability to other groups of teachers, in other settings across the country.

Appendices



INSTITUTE FOR INDEPENDENT EDUCATION
MATH Alive! COURSE
July 15, 1986

AGENDA

Sunday, July 27, 1986

3:00 - 6:00	Arrival and Accommodation Registration (Anderson Hall)
6:30 - 7:30	Reception with Faculty and Friends (Mary Gradon Center, Private Dining Room)
7:30 - 8:00	ORIENTATION SESSION

*[**NOTE:** ALL CLASSES WILL BE HELD IN "WARD CIRCLE BUILDING" ROOMS 108 AND 110, UNLESS OTHERWISE SPECIFICALLY NOTED ON THIS AGENDA.]*

Monday, July 28, 1986

8:30 - 9:30	Pretesting (Standardized, math content test)
9:30 - 10:15	Welcome to MATH Alive!
10:30 - 12:30	Guest Speaker: Dr. Edwin J. Nichols "Cultural Foundations in the Teaching of Mathematics"
2:00 - 4:00	CLASSROOM MANAGEMENT: ISSUES
4:15 - 5:30	CLASSROOM MANAGEMENT: WHO IS THAT CHILD?

Tuesday, July 29, 1986

8:30 - 9:00	Classroom and project assignments
9:00 - 10:15	MATH LECTURE: NUMBER THEORY
10:30 - 12:15	Problem Solving Applications
2:00 - 4:00	MATH LECURE: NUMBER THEORY
4:15 - 5:30	Problem Solving Applications
7:00 - 7:45	Learning Teams (Letts Formal Connecting Lounge in Anderson Hall)

Wednesday, July 30, 1986

8:30 - 10:15	MATH LECTURE: NUMBER SYSTEMS
10:30 - 12:15	Problem Solving Applications
2:00 - 4:00	CLASSROOM MANAGEMENT: ENVIRONMENT
4:15 - 5:30	Learning Teams
5:30 - 6:30	Staff Meeting

Thursday, July 31, 1986

8:30 - 10:15	MATH LECTURE: NUMBER SYSTEMS
10:30 - 12:15	Problem Solving Applications
2:00 - 4:00	MATH LECTURE: PROBABILITY & STATISTICS
4:15 - 5:30	Problem Solving Applications
7:00 - 8:30	Learning Teams (Letts Formal Connecting Lounge)

Friday, August 1, 1986

8:30 - 10:15	CLASSROOM MANAGEMENT: MATH CURRICULUM ISSUES
10:30 - 12:15	CLASSROOM MANAGEMENT: CURRICULUM CONTENT/FORMAT
2:00 - 4:00	MATH LECTURE: PROBABILITY & STATISTICS
4:15 - 5:30	Overview of Geometry Principles
7:00 - 9:00	Banquet - Guest Speaker: Dr. Arthur Jones "Innovation and Motivation for Excellence in Mathematics Education" (Mary Graydon Center, Private Dining Room)

Monday, August 4, 1986

8:30 - 10:15	MATH LECTURE: GEOMETRY
10:30 - 12:15	MATH LECTURE: PROBABILITY & STATISTICS
2:00 - 4:00	CLASSROOM MANAGEMENT: ENABLING ACTIVITIES
4:15 - 5:30	Classroom Management Demonstration

Tuesday, August 5, 1986

8:30 - 10:15	MATH LECTURE: GEOMETRY
10:30 - 12:15	Problem Solving in Geometry
2:00 - 4:00	CLASSROOM MANAGEMENT: MATH ANXIETY
4:15 - 5:30	Learning Teams
7:00 - 8:30	Learning Teams (Living Learning Center on the Terrace of Anderson Hall)

Wednesday, August 6, 1986

8:30 - 10:15	MICROCOMPUTERS I (Batelle Building, Room 100)
10:30 - 12:15	MICROCOMPUTERS II (Batelle Building, Room 100)
2:00 - 4:00	Learning Teams: Developing Field Projects
4:15 - 5:15	Consultation with Learning Teams

Thursday, August 7, 1986

8:30 - 10:15	CLASSROOM MANAGEMENT: DEMONSTRATION & FIELD PROJ.
10:30 - 12:15	CLASSROOM MANAGEMENT: DEMONSTRATION & FIELD PROJ.
2:00 - 3:00	Break
3:00 - 4:00	Post-testing (Standardized, math content test)
4:15 - 5:30	Consultation with Learning Teams
7:00 - 8:15	Learning Teams

Friday, August 8, 1986

8:30 - 9:30	Program Evaluation
9:30 - 10:00	Site Visit Planning
10:00 - 10:45	Learning Teams Presentation
11:00 - 11:30	Summary and Recognition Program
12:00 - 1:30	Luncheon Guest Speaker: Dr. John Henrik Clarke "African Contributions to Early Mathematics and Technology" (Mary Graydon Center, Private Dining Room)
2:00 -	Checkout and Travel for Some Participants

INSTITUTE FOR INDEPENDENT EDUCATION
MATH Alive! COURSE
July 31, 1986

REVISED AGENDA

Monday, August 4, 1986

8:30 - 10:15	MATH LECTURE: GEOMETRY
10:30 - 12:15	MATH LECTURE: PROBABILITY & STATISTICS
2:00 - 4:00	CLASSROOM MANAGEMENT: ENABLING ACTIVITIES
4:15 - 5:30	Classroom Management Demonstration

Tuesday, August 5, 1986

8:30 - 10:15	MATH LECTURE: GEOMETRY
10:30 - 12:15	Problem Solving in Geometry
2:00 - 4:00	THEORY & PRACTICE: BRIDGING THE GAP IN NUMERATION
4:15 - 5:30	CLASSROOM MANAGEMENT: MATH ANXIETY
7:00 - 7:45	CLASSROOM MANAGEMENT: MATH ANXIETY CONT'D (Living Learning Center on the Terrace, Anderson Hall)
7:45 - 8:30	LEARNING TEAMS

Wednesday, August 6, 1986

8:30 - 10:15	MICROCOMPUTERS I (Battelle Building, Room 100)
10:30 - 12:15	MICROCOMPUTERS II (Battelle Building, Room 100)
2:00 - 4:00	Learning Teams: Developing Field Projects
4:15 - 5:15	Consultation with Learning Teams

Thursday, August 7, 1986

8:30 - 9:30	Post-Testing: Mathematics
9:45 - 10:45	Consultation with Learning Teams
11:00 - 12:00	Review of textbooks and materials
2:00 - 3:45	CLASSROOM MANAGEMENT: DEMONSTRATIONS & FIELD PROJ.
4:00 - 5:45	CLASSROOM MANAGEMENT: DEMONSTRATIONS & FIELD PROJ.

Friday, August 8, 1986

8:30 - 9:30	Program Evaluation
9:30 - 10:00	Site Visit Planning
10:00 - 10:45	Learning Teams Presentation
11:00 - 11:30	Summary and Recognition Program
12:00 - 1:30	Luncheon w/Guest Speaker: Dr. John Henrik Clarke "African Contributions to Early Mathematics and Technology" (Mary Graydon Center, Private Dining Room)
2:00 -	Checkout and Travel for Some Participants

THE INSTITUTE FOR INDEPENDENT EDUCATION PROFESSIONAL DEVELOPMENT SURVEY

IIE would like to know how you feel about the teaching profession. Please take a few minutes to provide the following information. You need not give your name unless you wish to do so.

PART I

Using the scale provided below, circle the most appropriate response:

Strongly Agree 1 2 3 4 5 Strongly Disagree

1. I am a skilled professional educator.	1	2	3	4	5
2. My teaching techniques need upgrading.	1	2	3	4	5
3. Instructional support services at my school are adequate.	1	2	3	4	5
4. I feel at ease teaching my students math.	1	2	3	4	5
5. I would like to increase my knowledge in mathematics.	1	2	3	4	5
6. I am completely on my own to find instructional support services.	1	2	3	4	5
7. Teachers in my school have a sense of collegiality and sharing.	1	2	3	4	5
8. Some students I teach are impossible for me to handle.	1	2	3	4	5
9. I have to deal routinely with non-academic problems of the students I teach.	1	2	3	4	5
10. Instructional support services at my school are non-existent.	1	2	3	4	5
11. I am responsible for the level of achievement my students reach.	1	2	3	4	5
12. The students' home situation is more important than what the school does in influencing student performance.	1	2	3	4	5
13. I like teaching.	1	2	3	4	5
14. The MATH ALIVE! seminar will permit me the opportunity to increase my repertoire of skills as a teacher of mathematics.	1	2	3	4	5
15. I am less than enthusiastic about continuing in teaching.	1	2	3	4	5
16. I am not as confident teaching math as I am teaching other subjects.	1	2	3	4	5
17. I would like to receive training directed at making me a better teacher.	1	2	3	4	5

PART II

1. Name (optional) _____ Male____ Female_____

2. Ethnicity: _____Caucasian _____Asian

_____Black _____American Indian

_____Hispanic _____Other (specify)_____

3. Highest academic degree: ____Bachelors

____Masters

____Doctorate

____Other (specify)_____

4. Year received highest academic degree _____

5. In what area is your highest degree:

_____ Elem ed _____ English _____ Math _____Phys. Sc

_____ Art _____ For. Lang _____ Music _____Soc. Sc

_____ Business _____ Life Sc _____ Phys. Ed. _____Other_____

6. In what areas are you certified to teach:

_____ Elem ed _____ English _____ Math ____Phys. Sc

_____ Art _____ For. Lang _____ Music ____Soc. Sc

_____ Business ____ Life Sc _____ Phys. Ed. ____Other_____

7. Number of years teaching_____ 8. Grade levels you taught last year: (Circle)

K 1 2 3 4 5 6 7 8 9 10 11 12

9. Subjects you taught last year:

_____ Elem ed _____ English _____ Math ____Phys. Sc

_____ Art _____ For. Lang _____ Music ____Soc. Sc

_____ Business _____ Life Sc _____ Phys. Ed. ____Other_____

10. Special skills: Please describe using the space below

MATH ALIVE! PROFESSIONAL DEVELOPMENT SEMINAR

IIE is investigating professional development programs to determine what works best in the renewal process of excellent teachers. Please take a few minutes to provide the following information relative to your experiences in the program.

PART I

Using the scale provided below, circle the most appropriate response:

Strongly Agree 1 2 3 4 5 Strongly Disagree

1. The MATH ALIVE! seminar offered me the opportunity to develop professionally.	1	2	3	4	5
2. What I learned will be applied in the classes I teach.	1	2	3	4	5
3. Before the seminar, my teaching techniques needed upgrading.	1	2	3	4	5
4. I will share what I learned with other teachers in my school.	1	2	3	4	5
5. I am a skilled professional educator.	1	2	3	4	5
6. I am still not sure about continuing in teaching.	1	2	3	4	5
7. I have increased my knowledge in mathematics.	1	2	3	4	5
8. The seminar has taught me how to handle future need for instructional support services.	1	2	3	4	5
9. The setting for the program was conducive to learning.	1	2	3	4	5
10. The duration of the program was of sufficient length.	1	2	3	4	5
11. Resources for applying what I learned are lacking at my school.	1	2	3	4	5
12. As a result of the seminar I am confident about handling math.	1	2	3	4	5
13. Communication between myself and the instructors of MATH ALIVE! was adequate.	1	2	3	4	5
14. I would like to continue to receive the kind of training that was offered in this seminar.	1	2	3	4	5
15. MATH ALIVE! did not offer me what I needed.	1	2	3	4	5
16. I feel better able to cope with difficult students.	1	2	3	4	5
17. As a result of this seminar, I like teaching even more.	1	2	3	4	5

PART II (Use additional pages if necessary)

1. What in your opinion were the major strengths of MATH ALIVE! _____

2. What in your opinion were the weaknesses of MATH ALIVE! _____

3. What in your opinion was the most significant result of the program _____

4. What changes would you like to see incorporated in the program _____

5. As a result of this seminar, I am going to do the following:

   a. _____

   b. _____

   c. _____

6. If you have comments about anything else, please use the following lines _____

BASIC SKILLS MATH TEST NAME _____

Part I. Do the following problems, reduce fractions to lowest terms, circle the letter that corresponds to the correct answer.

1. $1/3 + 1/6 =$
   A 1/9
   B 2/9
   C 5/18
   D 1/2

2. $21\frac{1}{4} + 3\frac{2}{5} =$
   A $24\frac{1}{3}$
   B $24\frac{3}{5}$
   C $24\frac{13}{20}$
   D $24\frac{3}{4}$

3. $7\frac{1}{2} + 8.5 =$
   A 15
   B 15.5
   C 15
   D 16

4. $73\frac{1}{2} + 22\frac{2}{3} + 34\frac{3}{4} =$
   A $129\frac{1}{4}$
   B $130\frac{11}{12}$
   C 131
   D $131\frac{5}{12}$

5. $1\frac{19}{100} + 2\frac{1}{10} + 3\frac{56}{100} =$
   A $6\frac{3}{50}$
   B $6\frac{3}{20}$
   C $7\frac{3}{20}$
   D $7\frac{33}{50}$

6. $6x + 3x + 4x =$
   A 11x
   B 12x
   C 13x
   D $13x^2$

7. $2^2 + 5^2 =$
   A 14
   B 29
   C 49
   D 74

8. $0.04 + 0.127 + 0.2784 =$
   A 0.3354
   B 0.3454
   C 0.4354
   D 0.4454

9. $31.2 + 7.61 + 0.0831 + 6.0 =$
   A 34.3831
   B 43.8831
   C 44.821
   D 44.8931

10. $12\frac{1}{4} + 12.14 =$
    A 12.50
    B 24.28
    C 24.39
    D 24.64

11. $(0.09)^2 + (0.7)^2 =$
    A 0.4981
    B 0.8149
    C 1.3
    D 1.58

12. $-17 + 11 =$
    A -28
    B -6
    C 6
    D 28

13. $5a - 3a =$
    A 2
    B 2a
    C a^2
    D 8a

14. $(1/5 \times 40) - (\frac{1}{4} \times 12) =$
    A 1
    B 2
    C 4
    D 5

15. $3^2 - 2^3 =$
    A 0
    B 1
    C 3
    D 9

16. $2/3 \div 1/9 =$
    A 1/3
    B 4/9
    C 5/9
    D 7/9

19.
$$\begin{array}{r} 57.4900 \\ -\ 6.3382 \\ \hline \end{array}$$
A 50.0518
B 51.0618
C 51.1518
D 51.1628

20. $76\frac{3}{5} - 6.11 =$
A 69.51
B 70.49
C 70.59
D 70.71

21. $-3.7 - 5.36 =$
A -9.06
B -1.6
C 1.6
D 9.06

22. $16 - (-8) =$
A 2
B 8
C 16
D 24

23. $\frac{x}{2} - \frac{x}{5} =$
A 1/10
B x/10
C 3/10
D 3x/10

24. $4^2 - (0.2)^3 =$
A 15.4
B 15.92
C 15.94
D 15.992

25.
$$\begin{array}{r} 976 \\ \times\ 40 \\ \hline \end{array} =$$
A 3,904
B 3,940
C 36,040
D 39,040

26.
$$\begin{array}{r} 618 \\ \times\ 37 \\ \hline \end{array} =$$
A 6,180
B 12,866
C 22,866
D 23,886

27. $\frac{1}{5} \times \frac{1}{5} =$
A $\frac{1}{25}$
B $\frac{2}{25}$
C $\frac{1}{5}$
D $\frac{2}{5}$

28. $\frac{1}{4} \times \frac{4}{9} =$
A $\frac{1}{9}$
B $\frac{1}{4}$
C $\frac{4}{9}$
D $\frac{5}{9}$

29.
$$\begin{array}{r} 4,063 \\ \times\ 702 \\ \hline \end{array} =$$
A 292,536
B 2,842,226
C 2,852,226
D 2,852,526

30. $7 \times 3\frac{1}{2} =$
A $21\frac{1}{2}$
B $22\frac{1}{2}$
C $24\frac{1}{2}$
D 26

31. $43.75 \times 2\frac{1}{5}$
A 95.25
B 96.25
C 96.27
D 962.5

32. $6\frac{1}{3} \times \frac{2}{5} =$
A $1\frac{9}{15}$
B $2\frac{7}{15}$
C $2\frac{8}{15}$
D $3\frac{1}{15}$

33.
$$\begin{array}{r} 597.6 \\ \times\ \ 4 \\ \hline \end{array} =$$
A 2,288.4
B 2,368.4
C 2,390.4
D 23,904

34.
$$\begin{array}{r} 37.42 \\ \times\ 0.034 \\ \hline \end{array} =$$
A 1.27228
B 2.06168
C 11.6228
D 12.7126

35. $5y \cdot 4y =$
A 9y
B $9y^2$
C 20y
D $20y^2$

36. $x^2 \cdot x^3 =$

A $5x$
B $3x^2$
C x^5
D x^6

37. $4\overline{)426} =$

A $98\frac{1}{2}$
B $101\frac{1}{2}$
C $106\frac{1}{2}$
D $114\frac{1}{2}$

38. $44\overline{)14,564} =$

A 212
B 326
C 328
D 331

39. $52\overline{)4,685} =$

A. $89\frac{41}{52}$
B $90\frac{5}{52}$
C $90\frac{25}{26}$
D $91\frac{7}{52}$

40. $200\overline{)800} =$

A 4
B 10
C 40
D 400

41. $.04\overline{)0.904} =$

A 0.226
B 2.16
C 2.26
D 22.6

42. $0.2\overline{)8} =$

A 0.4
B 4
C 40
D 400

43. $\frac{1}{5} \div \frac{1}{5} =$

A 1/25
B 1/5
C 1
D 5

44. $\frac{5}{6} \div \frac{1}{3} =$

A 5/18
B 1
C 2
D $2\frac{1}{2}$

45. $5\frac{4}{5} \div 4\frac{1}{3} =$

A 53/65
B $1\frac{53}{65}$
C $1\frac{29}{65}$
D $24\frac{2}{15}$

46. $90 \div 3\frac{1}{2} =$

A $25\frac{3}{7}$
B $26\frac{1}{2}$
C $28\frac{1}{7}$
D 315

47. $-\frac{2}{3} \div 6 =$

A -4
B -1/9
C 1/9
D 4

48. $\frac{x^3 - x^2}{x} =$

A $2x - x$
B $x^2 - x$
C $x^2 - 1$
D $3x^2 - 2x + 1$

49. $160 \div 32 \div 4 =$

A 64
B 43
C 168
D 48

50. $(22.5)10 + 25 =$

A 57.5
B 47.5
C 787.5
D 250

17. $6 - 3\frac{1}{8} =$

A $2\frac{1}{8}$
B $2\frac{7}{8}$
C $3\frac{1}{8}$
D $3\frac{7}{8}$

18.

$$\begin{array}{r} 700.00 \\ -\ 18.55 \\ \hline \end{array} =$$

A 681.45
B 682.45
C 691.55
D 781.45

Part II. Math Applications. Answer the following by circling the letter which corresponds to the correct answer.

51. Which of the following has the greatest value?

A $1\frac{3}{4}$

B $1\frac{1}{6}$

C $1\frac{7}{24}$

D $1\frac{1}{8}$

52. Which of these decimal fractions lies on the number line between 0.3 and 0.4?

A 0.03
B 0.14
C 0.31
D 0.41

53. Which of these shows 0.731 written as a percent?

A 0.731%
B 7.31%
C 73.1%
D 731%

54. Which of the following is $\sqrt{25}$?

A 5
B 25
C 100
D 625

55. On the number line, what number is 11 units more than negative 3?

A negative 14
B positive 8
C positive 11
D positive 14

56. What are the integral factors of the prime number 5?

A 0 and 5
B 1 and 5
C 4 and 1
D 2 and 3

57. What do you need to know to find the average score on a spelling test for a class of 25 students?

A the scores of the passing students
B the number of questions in the test
C the score of each student on the test
D the number of questions omitted by each student

58. A train went 186 miles in 3 hours and 18 minutes. How can you find out how fast the train was traveling?

A add 186 and 318
B subtract 186 from 198
C multiply 186 by 3.3
D divide 186 by 3.3

59. Mr. Martin borrowed $400 at 6% per year. What else must you know to find out how much money he had to pay back?

A no other information
B how long he kept the money
C when he borrowed the money
D when he paid part of the money back

60. For which of the figures below is the perimeter formula P = 3s correct?

A B C D

61. F = (1.8 x C) + 32
What is the equivalent of 30 degrees Celsius (30° C) on the Fahrenheit (F) scale?

A 38° F
B 54° F
C 86° F
D 98° F

62. What is the minimun number of one-gallon buckets needed to hold 23 quarts of water?

A 5 B 6 C 7 D 8

MATH Alive! July 29, 1986
(Chachere)

CONTENT PRETEST

Section I

1. What is a counting number?

2. What is a prime number?

3. Draw or write the factor tree for 1200.

4. Use Euclid's Algorithm to find the greatest common factor of 48 and 20.

5. What is the least common multiple of 28, 32, and 54?

6. Are there a finite number of primes? Why?

7. What is the sieve of Eratosthenes?

8. What is a perfect number?

9. Without using long division, find out if 11 is divisor of 113,949.

Section II

1. What is a number system?

2. What is a binary operation?

3. Is the set of all counting numbers greater than 10 closed under addition? Why?

4. Is subtraction associative? Why?

5. Is division commutative? Why?

6. For a family of subsets of some set, what is the identity element for the union operation?

7. Give an example to show that the following is not a general rule:
$a+(b.c) = (a+b) . (a+c)$

8. Define multiplicative inverse.

Content Pretest (Chachere) 7/31/86, page 2

Section III

1. In probability theory, what do the following terms mean: a) sample space; b) an outcome; and c) an event.

2. If every outcome of a particular experiment is equally likely, then what is the probability of an event?

3. Given a pair of fair dice:
   a) What is the probability of rolling 6 (i.e., 6 dots are up)?
   b) What is the probability of rolling 6 twice in two rolls?

4. Calculate the mean, media, mode, and standard deviation of the following data:
   60, 70, 70, 75,
   50, 50, 80, 90,
   40, 50, 80, 85.

Section IV

1. Given that the endpoints of a line segment are (-s, 3) and (2,4), what is the slope and the midpoint of the line segment?

2. What is the area of a polygon with vertices (1,3), (7,-2), (-4,4) and (-2,1).

3. Give an example of a pair of line segments such that the line segments are parallel. Give a pair that are perpendicular.

4. Define: a) a square; b) a rectangle; c) a rhombus; d) a parallellogram; and e) a trapezoid.

MATH Alive! August 7, 1986
(Chachere)

MATHEMATICS CONTENT POST-TEST

Part I

1. What is a rational number?

2. Draw a factor tree for 8820.

3. Use the Euclidean Algorithm to find the greatest common factor of 164 and 84.

4. Define "perfect number." Prove that 28 is perfect.

5. Is the number 222,222,222 divisible by 9? Find out without using division.

Part II

6. What is a number system?

7. Is the set of odd integers closed under multiplication?

8. Name an operation on the integers that is not associative.

9. Name an operation on the rational number that is not commutative.

10. Consider the GCF (greatest common factor) and LCM (least common multiple) as operations on counting numbers. Give three examples showing that GCF is distributive over LCM.

Part III

11. Define the following (in the context of probability theory): a) sample space, outcome, and event.

12. If each outcome of an experiment is equally likely, then what is the probability of an event.

13. A coin will be tossed three times. What is the probability of getting three heads? What is the probability of getting two heads?

14. Calculate the mean, mode, and median of the following data:
10 15 20 55 30 40 45 70 20 25 40 50.

Content Post-Test (Chachere), page 2

Part IV

15. Given that the end points of a line segment are (-2,-3) and (4,3), find the length, midpoint, and slope.

16. Draw the simple, closed polygon with vertices (2,2) (7,3) (10,1) (5,7) on graph paper. Find the polygon's area.

17. Which pair of line segments is perpendicular?

$\overline{(1,1)\ (7,3)}$ $\overline{(4,0)\ (3,4)}$ $\overline{(1,3)\ (0,6)}$

18. Draw the simple, closed polygon with vertices (3,-1) (8,3) (3,7) (-2,3). Prove that it is a rhombus but not a square.

MATH ALIVE! POST-TEST NAME _____

Part I. Please answer the following questions in the space provided.

1. Define what is meant by:

   a. N is divisible by S _____

   b. N is a multiple of S _____

   c. S is a prime number _____

   d. S is a prime factor of N _____

2. Given that $(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$, find $(a+b)^5$ without expanding _____

3. Use a factor tree to find the prime factors of:

   a. 5280 _____

   b. 3850 _____

4. Construct the multiplication table for Z_6

5. State the properties that the number system $(Q,+,.)$ satisfies.

6. State the properties that the number system $(Z_6, \oplus, \otimes)$ satisfies.

7. If $V = \{1,2,3,4\}$, $K = \{1,2,3\}$, $G = \{1,4\}$, $H = \{2,3\}$ and $N = \{2,3,4\}$ find:

   a. $K \cap N$ _____

   b. $V \cup G$ _____

   c. G' _____

8. If we flip a penny twice:

   a. Write down the sample space for this random experiment _____

   _____

   b. What is the probability that we get a head on the first try? _____

   _____

9. Find the mean, range and median for the following set of data:

$\{10, 50, 30, 40, 10, 60, 10\}$

mean _____ range _____ median _____

Can you find the variance? _____

10. For the following lattice polygon: (2,2) (6,4) (7,1) (9,6) (2,6) (2,2)

a. Draw it and find its area _____

b. Find the slope of the line segment created by the first two points _____

Part II. Do the following questions, reduce fractions to lowest terms, circle the letter that co-responds to the correct answer.

1. $1/3 + 1/9 =$ A 2/9, B 4/9, C 5/18, D 5/12

2. $21\frac{1}{2} + 3\frac{2}{5} =$ A $24\frac{3}{5}$, B $24\frac{3}{7}$, C $24\frac{9}{10}$, D $24\frac{13}{20}$

3. $7\frac{1}{4} + 8.25 =$ A 15, B 15.25, C 15.5, D 16

4. $73\frac{1}{2} + 22\frac{2}{3} + 34\frac{3}{4} =$ A $129\frac{1}{4}$, B $130\frac{11}{12}$, C 131, D $131\frac{5}{12}$

5. $1\frac{29}{100} + 2\frac{3}{10} + 3\frac{1}{2} =$ A $6\frac{3}{50}$, B $6\frac{9}{50}$, C $7\frac{33}{100}$, D $7\frac{9}{100}$

6. $6x + 3x + 4x =$ A 11x, B 12x, C 13x, D 13x

7. $2^2 + 5^2 =$ A 14, B 29, C 49, D 74

8. $0.04 + 0.127 = 0.2784 =$ A 0.3354, B 0.3454, C 0.4354, D 0.4454

9. $41.2 + 7.61 + 0.0831 + 6.0 =$ A 44.3831, B 53.8831, C 54.821, D 54.8931

10. $12\frac{1}{2} + 12.14 =$ A 12.50, B 24.28, C 24.39, D 24.64

11. $(0.09)^2 + (0.7)^2 =$ A 0.4981, B 0.8149, C 1.3, D 1.58

12. $-27 + 11 =$ A -38, B -16, C 16, D 38

13. $5a - 3a =$ A 2, B 2a, C a^2, D 8a

14. $(1/5 \times 40) - (\frac{1}{4} \times 12) =$ A 1, B 2, C 4, D 5

15. $3^2 - 2^3 =$ A 0, B 1, C 3, D 9

16. $1/3 - 1/9 =$ A 1/6, B 2/9, C 1/12, D 1/9

17. $6 - 3\frac{1}{8} =$

A $2\frac{1}{8}$
B $2\frac{7}{8}$
C $3\frac{1}{8}$
D $3\frac{7}{8}$

18.

$$\begin{array}{r} 700.00 \\ -\ 18.55 \\ \hline \end{array} =$$

A 681.45
B 682.45
C 691.55
D 781.45

19.

$$\begin{array}{r} 57.4900 \\ -\ 6.3382 \\ \hline \end{array}$$

A 50.0518
B 51.0618
C 51.1518
D 51.1628

20. $76\frac{3}{5} - 6.11 =$

A 69.51
B 70.49
C 70.59
D 70.71

21. $-3.7 - 5.36 =$

A -9.06
B -1.6
C 1.6
D 9.06

22. $16 - (-8) =$

A 2
B 8
C 16
D 24

23. $\frac{x}{2} - \frac{x}{5} =$

A 1/10
B x/10
C 3/10
D 3x/10

24. $4^2 - (0.2)^3 =$

A 15.4
B 15.92
C 15.94
D 15.992

25.

$$\begin{array}{r} 976 \\ \times\ 40 \\ \hline \end{array} =$$

A 3,904
B 3,940
C 36,040
D 39,040

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$$\begin{array}{r} 618 \\ \times\ 37 \\ \hline \end{array} =$$

A 6,180
B 12,866
C 22,866
D 23,886

27. $\frac{1}{5} \times \frac{1}{5} =$

A $\frac{1}{25}$
B $\frac{2}{25}$
C $\frac{1}{5}$
D $\frac{2}{5}$

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A $\frac{1}{9}$
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C $\frac{4}{9}$
D $\frac{5}{9}$

29.

$$\begin{array}{r} 4{,}063 \\ \times\ 702 \\ \hline \end{array} =$$

A 292,536
B 2,842,226
C 2,852,226
D 2,852,526

30. $7 \times 3\frac{1}{2} =$

A $21\frac{1}{2}$
B $22\frac{1}{2}$
C $24\frac{1}{2}$
D 26

31. $43.75 \times 2\frac{1}{5}$

A 95.25
B 96.25
C 96.27
D 962.5

32. $6\frac{1}{3} \times \frac{3}{5} =$

A $1\frac{13}{15}$
B $2\frac{7}{15}$
C $2\frac{8}{15}$
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$$\begin{array}{r} 597.6 \\ \times\ \ 4 \\ \hline \end{array} =$$

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B 2,368.4
C 2,390.4
D 23,904

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$$\begin{array}{r} 37.42 \\ \times\ 0.034 \\ \hline \end{array} =$$

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B 2.06168
C 11.6228
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35. $5y \cdot 4y =$

A $9y$
B $9y^2$
C $20y$
D $20y^2$

36. $x^2 \cdot x^3 =$

A $5x$
B $3x^2$
C x^5
D x^6

37. $4\overline{)426} =$

A $98\frac{1}{4}$
B $101\frac{1}{2}$
C $106\frac{1}{2}$
D $114\frac{1}{4}$

38. $44\overline{)14,564} =$

A 212
B 326
C 328
D 331

39. $52\overline{)4,685} =$

A $89\frac{41}{52}$
B $90\frac{3}{52}$
C $90\frac{25}{26}$
D $91\frac{7}{52}$

40. $200\overline{)800} =$

A 4
B 10
C 40
D 400

41. $.04\overline{)0.904} =$

A 0.226
B 2.16
C 2.26
D 22.6

42. $0.2\overline{)8} =$

A 0.4
B 4
C 40
D 400

43. $\frac{1}{5} \div \frac{1}{5} =$

A 1/25
B 1/5
C 1
D 5

44. $\frac{5}{6} \div \frac{1}{3} =$

A 5/18
B 1
C 2
D $2\frac{1}{2}$

45. $5\frac{4}{5} \div 4\frac{1}{3} =$

A $\frac{53}{65}$
B $1\frac{22}{65}$
C $1\frac{39}{65}$
D $24\frac{2}{15}$

46. $90 \div 3\frac{1}{2} =$

A $25\frac{5}{7}$
B $26\frac{1}{2}$
C $28\frac{1}{7}$
D 315

47. $\frac{-2}{3} \div 6 =$

A -4
B -1/9
C 1/9
D 4

48. $\frac{x^3 - x^2}{x} =$

A $2x - x$
B $x^2 - x$
C $x^2 - 1$
D $3x^2 - 2x + 1$

49. $160 + 32 \div 4 =$

A 64
B 43
C 168
D 48

50. $(22.5)10 + 25 =$

A 57.5
B 47.5
C 787.5
D 250

American Choices

Volume 2, Number 2 *A REPORT OF THE INSTITUTE FOR INDEPENDENT EDUCATION, INC.* *OCTOBER 1986*

Intensive Seminar Prepares Math Teachers

Twenty-seven math teachers and teaching administrators from independent schools across the country recently spent from eight to ten hours daily in a Washington, D.C. seminar called "MATH Alive!"

The teachers came from New York, New Jersey, Pennsylvania, Maryland, the District of Columbia, North Carolina, Georgia, Mississippi, Louisiana, and California. All of them teach primarily Black youth from inner cities.

Photo by Tek-Trek Productions

Participants (Front): Dr. Ratteray, Sonja Wilson, Jayne Johnson, Hazel Jordan, Montein Haliburton, Paulette Plant, Bettye McNichols, Lynda Davis, Kathleen Turk, Katie Ferguson, Carol Hammond, and Peter Fusco. (Back): Uzo Okonkwo, Patricia Smith, Maritza Paul, Janice Harris, Corey Calamanco, Jean Williams, Robert Brevard, Patricia Gray, Kweli Shujaa, Carolyn Taylor, Alex Brikorang, Dr. Howard, and Tooran Ghadam. (Not shown. Valli Abdul Lateef, Anna Grant, Rebecca Hunter, and Cynthia Williams.)

The technique was "complete immersion," said Dr. Joan Davis Ratteray, President of the Institute for Independent Education and director of this project. Lectures and workshops were supported by learning teams, as well as several guest speakers on related subjects.

Lectures in math subjects included number theory, number systems, probability and statistics, and geometry. Additional sessions in each of these areas were devoted to solving problems. The math classes were conducted by Dr. Tepper Gill and Dr. Gerald Chachere, both professors of mathematics at Howard University.

Classroom management issues were discussed by Dr. Bess Howard, an independent consultant in math education and applied behavioral science.

The seminar was important because it was more than a one-way transfer of information from faculty to student. Dr. Ratteray said, "It involved discussions by the teachers of their own successful strategies for educating Black, Hispanic, and Asian-American children.

"We hear so much about how Blacks and other minority-group youth fail in math, it's encouraging to know that some teachers are successful in teaching it."

By bringing together all these approaches to the subject, the Institute will "help reevaluate how math is taught to America's inner-city youth."

Outside the primary class activities, learning continued through informal "learning teams." These were opportunities for the teachers to share experiences with each other, to work together on homework assignments, and to teach each other. They formed networks that will sustain their professional development after they return to their various schools.

Guest speakers also provided much to think about. Presentations by Dr. Edwin Nichols and Dr. John Henrik Clarke are described elsewhere in this issue.

In addition, Dr. J. Arthur Jones from Decision Information Systems Corporation

Continued on page 4

Culture: Key in Education of Minorities

What happens to the African frame of reference of a Black person who is learning in the European context of American schools?

"You don't lose it. You just suppress it, or you negate it," said Dr. Edwin J. Nichols as he opened the recent "MATH Alive!" seminar, sponsored by the Institute for Independent Education.

Dr. John Henrik Clarke concluded the two-week session by tracing African intellectual development from antiquity to contemporary America. He showed why Blacks should not even try to lose their African referents.

Nichols and Clarke were two of the guest speakers at the Washington, D.C., seminar for mathematics teachers in independent schools.

Dr. Nichols is chief of the Service Systems Technology Transfer Branch at the National Institute of Mental Health and former head of the Staff College at NIMH. He told the teachers how cultural differences between Blacks and Whites have a basis in philosophy that must be considered when teaching Black children.

Differences between persons of European and African descent can be seen by studying the *axiology*, or value system, of each group.

He argued that for Europeans, the focus is Man to the Object, where the highest value lies

Continued on page 3

INSTITUTE FOR INDEPENDENT EDUCATION

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Correspondence should be addressed to *American Choices*, P.O. Box 42571, Washington, D.C. 20015. Manuscripts are invited.

Back issues are available for $1.00 each.

Oswald M.T. Ratteray, Editor

Evaluator, Stella Gomes, assists teachers.

Editorial

Superparent

The Federal Government wants to reduce its influence in education, and the Nation's governors are anxious to flex their "new" muscle in this lateral transfer of power. But government is gove.nment, and families will be in the same dilemma as they were previously.

Working parents created the phenomenon of latchkey children, so the government is threatening to have a longer school year.

Poor children often lag behind mainstream youth in academic performance, so government wants to start an aggressive campaign to capture them at four years old. The rich diversity of preschool options would be dismantled.

The Nation suddenly realized that there were too many illiterate students and incompetent teachers, as well as a teacher shortage, so government is pushing for centrally-controlled standards that will force even creative teachers to walk in academic lockstep.

Government is obviously taking on more than it can handle. High dropout rates, low test scores, and overcrowded juvenile centers prove it cannot take care of the children already under its control. How can it take on more?

All America suffers, but Black America is especially victimized. Yet, we keep coming back for more. We defend with religious fervor government's role as superparent, taking care of all our needs. But, taking this road to the "American Dream" has led to our intellectual suicide.

There are some things government can do well. Producing "cookie cutter" children of the state shouldn't be one of them.

Will the REAL parents please stand up? ★

Joan Davis Ratteray

—Joan Davis Ratteray

Photos by Tele-Trek Productions

Reflections on "MATH Alive!"

"[Dr Chachere] made me feel at home and so relaxed that I learned. He watches people's faces, which I don't do in my class."

Dr. Chachere

"When I go back, I'm going to have to give this information to the whole school."

"Don't say you can't get this. Take that block away from there...Your mind will open up if you allow it to."

"If you take your lunch hour or an hour in the afternoon just to show that child you are concerned, he'll work his head off."

"[The seminar faculty] do not feel they're going to be lessened as people or as teachers if someone else has another way of doing things."

"I had truly forgotten how impossible it had been for me as a child to sit, and sit, and sit."

"I won't tell anybody else I understand something when I know I don't know it."

"It's not like [Dr. Gill] wrote our text overnight. He had his act together long before we came here. As teachers, we should have our lessons prepared long before the students get to the class."

"God made it possible for this workshop to go as well as it did."

Dr. Gill

Culture

Continued from page 1

Photos: Tele-Trek

Dr. Nichols

in the object or the acquisition of the object. For Africans, it is Man-to-Man, the highest value being in interpersonal relationships.

For example, White farmers kill themselves when they lose their land (the Object). Most Blacks who are in prison for murder are there because they killed another male relative or close friend when the *relationship* between the two was broken. "Life itself then was of secondary value," Dr. Nichols said.

He explained, in a similar vein, differences between Euro-Americans and African-Americans based on *epistemology* (how they come to know knowledge) and *logic systems* (how they reason).

Dr. Clarke is a distinguished historian, author, and Professor Emeritus at Hunter College, New York.

He spoke of African contributions to mathematics, science, and technology, which he called "Africa's gift to humanity."

Beginning in the 15th century, historians started to belittle and obscure the light that stretched from the Nile Valley to southern Africa.

They began by treating Egypt as if it did not exist within the body of Africa, claiming that it laid the foundation for western civilization.

Photos: Tele-Trek

Dr. Clarke

Dr. Clarke began by putting Egypt back into Africa. He chronicled African achievements, including those of Imhotep, the father of medicine; Africa's first book some 3,000 years before Homer's *Odyssey*, and the University of Sankore at Timbuktu.

African contributions continued into the New World. As a result of the slave trade, Africa lost and the Americas gained not just bodies but skills.

Many of the contributions of these Africans are still standing to this day.

Continued on page 4

Sensitive Teachers Have Better Students

In math instruction, "there's a difference between management and control," said Dr. Bess Howard during a recent seminar sponsored by the Institute for Independent Education for mathematics teachers in independent schools.

Dr. Howard described many principles for effective classroom management. One of the most important was the need for teachers to analyze their own behavior, be sensitive to the unique needs of students and how they learn, and try to understand the impact they must be having on their students.

Many children, especially minorities, feel beaten by the system. Often, however, children are simply not being encouraged to take charge of the learning process where they can.

When teachers help students to shift this locus of control, "attendance improves, and discipline problems decrease," Dr. Howard added.

Photo: Tele-Trek

Dr Howard

She also discussed how teachers can affect the physical and psychological learning environment, as well as the steps needed to build or revise a curriculum.

A demonstration of manipulatives for math classes showed how to bridge the gap between concrete and abstract reasoning. Other learning experiences or "enabling activities" illustrated how to make it easier for students to realize the teacher's curriculum objectives.

Math anxiety, a widespread dislike for math and math-related activities was called a communicable "dis-ease," often spread by teachers and parents themselves.

Dr. Howard outlined a concept she developed several years ago for changing attitudes toward mathematics. She recommended linking mathematics to other areas of the curriculum, such as art, music, and science.

Exploring the mathematical dimensions of themes in which children are interested produces more involved students.

A full report on Dr. Howard's lectures will appear later this year when the Institute publishes *Teaching Mathematics.* ★

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Math

Continued from page 1

talked about motivating young people to love math.

Sister Mu'minah Saleem, a demonstration teacher in the District of Columbia, showed how mental discipline reduces the possibility for error in problem solving.

A written paper was supplied by Mr Walter Young, Associate Professor of Mathematics at the University of the District of Columbia, showing classroom applications for research that was reported in the book *Africa Counts*.

There was also a demonstration on computers in math instruction by Karen Vogel, a representative of IBM, and review copies of textbooks from many publishers

The schools represented at the seminar included secular preparatory schools, as well as Christian and Muslim schools. Most are owned and operated by Blacks. This is believed to be the first time that such a diverse group has met for this type of training.

As Dr. Ratteray pointed out, "These teachers share a common bond. They are developing enhanced programs for the minority-group youth who attend their schools."

The lectures and workshops were held from July 27th to August 8th on the campus of The American University. Later in the year, the faculty will visit the schools and see how the teachers have implemented the ideas learned in the seminar.

The final report is due in the spring of 1987, but the Institute will publish part of it as *Teaching Mathematics* in November 1986 and include a section on classroom management.

"MATH Alive!" is a pilot project, funded by the National Science Foundation. ★

Culture

Continued from page 3

Both Dr. Clarke and Dr. Nichols expressed concern about how teachers reach and motivate African-American children in classrooms.

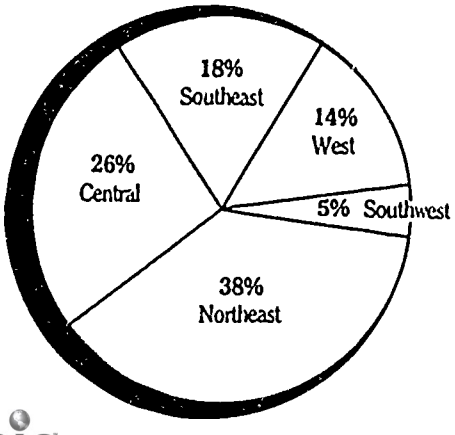
In schools, Dr. Nichols said, children from one group are expected to use the strategies of another group. Understanding the philosophical bases for group differences can help teachers minimize cross-cultural problems that inhibit learning.

When children say that math is difficult, Dr. Clarke urged teachers to have the children look at the totality of their history, because Africans found building pyramids was difficult. "They did it, and nobody did it for them."

Africans at home and in the diaspora are in the enviable position of not needing to conquer anybody, but they have to reconquer their territory and themselves. "The key to achieving this," he added, "is in the restoration of self-confidence."

A full account of the speakers' remarks will be contained in Teaching Mathematics, to be published by the Institute in November 1986. ★

Institute Builds Network



A recent survey by the Institute has verified the existence of 220 schools in 30 states, the District of Columbia and the Virgin Islands. The chart on the left shows the percentage of known schools in each geographic area. Only five-day schools were surveyed. Weekend schools and tutorial programs were omitted.

Some schools that once enrolled only a handful have hundreds this school year. Others identified a year ago have now closed, while several new ones opened. Schools that have been in existence for many years are still being located, and there is also a long list of day schools yet to be verified. ★

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'Math Alive' trains teachers

THE MICHIGAN CITIZEN SEPTEMBER 7 — 13, 1986

By Dr. Joan Davis Ratteray
NNPA Special Report

How do you turn out better math teachers in only two weeks? The answer is intensive training, eight to ten hours daily with lots of homework, extra reading, and substantive lunch and dinner speakers.

This was what happened recently when 27 teachers came to Washington, D.C.. These are teachers of mathematics who serve primarily Black youth at inner-city independent schools in New York, Pennsylvalia, Maryland, the District of Columbia, North Carolina, Georgia, Mississippi, Louisiana and California.

The program, MATH Alive!, was sponsored by the Institute for Independent Education and funded as a pilot project by the National Science Foundation. There were three parts to the program.

One was to upgrade the teachers' skills in mathematics, dealing with number theory, number systems, geometry, and probability and statistics. These courses were taught by Dr. Tepper Gill and Dr. Gerald Chachere, both math professors at Howard University.

The second part of the course involved state-of-the-art discussions on classroom management, presented by Dr. Bess Howard, an independent consultant in math education and applied behavioral science. There were also presentations on computers in instruction and management by employees from IBM, as well as review copies of textbooks from many publishers.

The third aspect involved discussions by the teachers of their own successful strategies for educating Black, Hispanic and Asian-American children.

Featured guest speakers included Dr. Edwin Nichols, from the National Institute of Mental Health, and Dr. John Henrik C[illegible], distinguished scholar, [illegible], and Professor Emeritus at Hunter College in New York.

Seminar participants came from a broad range of institutions, including secular preparatory, Christian and Muslim schools. Nearly all are owned and operated by Blacks. They are also independent of other large organizations or churches, both financially and in curriculum development.

The schools whose delegates were selected represented hundreds of similar schools across the country, some of which have been in existence for 50 years. This was a history-making seminar, because it was the first time that such a diverse group of schools has ever met for such intensive training.

In the past, independent neighborhood schools have tended to be isolated from one another. They now have the Institute for Independent Education as a national support group. It offers both technical assistance to the schools and policy studies for educators.

For a report on the seminar or for information about the Institute, write to the Institute for Independent Education, P.O. Box 42571, Washington, D.C. 20015.